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When we think of safety in the construction industry, it is all too common that the discussion starts with the worker and the construction site. This is the wrong approach; it is not the site and the workers that we should be interested in but the whole process of inception design, tendering, construction and facilities management. This process sets the scene for how we perceive what goes on on the construction site.

We are all well aware of the "winners curse". This is an inevitable consequence of competitive tendering and the lack of integration in the design and construction processes. It is time for a sea-change in thinking about project delivery and the end product and we need to sit down and attempt to make sense of the construction business model which is broken at the project, firm and the industry levels.

A good example, that has been used by researchers recently, is to go back to the sociotechnical systems, viewpoint. Seminal work in this area was undertaken by Bamforth and Trust when they worked with Nottinghamshire Miners and studied there approach to managing a new production system, the longwall system. The outcome of the research indicated that the miners had in fact developed their own safety culture and production culture. They chose and understood their fellow workers and had good safety and production capacity and capability. Thus, the change in technology led to a change in the social fabric work of the workgroup on the way they interacted with their managers.

This approach basically the parallels goes on in the construction industry. There is a clear distinction between the corporate part of the business and the project side of the business, that must live with the consequences of the "winners curse". This typical scenario leads to production pressure and quality pressure that drives industry to produce shoddy products, lacking integration at the macro level, between client, designer, contractor, subcontractor and facilities manager and at the micro level that takes place on the construction site itself

Predominantly, early work on construction published in the construction related journals was somewhat moribund and practice based, lacking an underpinning of both theory and rigorous analysis. The general safety related journals such as Safety Science, Accident Analysis and Prevention and Applied Ergonomics focused much more on theoretically based, sound analytical research. Only in recent years has more work related to the construction industry been published in such journals. This could be explained in that much research has been focused on practice and its description and its deconstruction rather than looking for underlying theories to enlighten in terms of how OHSW is mismanaged in the industry. The same can be said to apply to construction management research in general.

The Swiss Cheese model of James Reason has been usefully adopted by the construction industry, and researchers, in that it appears to be an extension of the work of Heinrich, but explains why accidents still happen. However, Reason's approach was based on identifying two forms of unsafe acts. Rule-based mistakes and knowledge based mistakes . That drove thinking in a more mature and less simplistic direction. However, one of my favourite quotes from Reason is his discussion of error management measures:

"It is simply not possible to order in a package of Error Management measures, implement them and then expect them to work without further attention. You cannot put them in place and then tick them off as another job completed. In an important sense, the process - the continuous striving toward system reform - is the product."

This should be food for thought for the construction industry.

One of the issues to bear in mind when looking at the work of Reason is that the businesses he was working with were much more static than the construction industry. They are large, worldwide industries in the same way, but had very different people at the front end of the business, for example aviation and the pilot and co-pilot. Thus, his approaches need to be addressed from an understanding of the industries in which they were successful. There is no quick fix for the construction industry.

One of the annoying aspects of much of the research into construction safety is the issue of human error. Construction managers and researchers are quick to blame the frontline workforce wherever possible. Dekker addressed this. He was not willing to accept that human error was a problem in work performance. He famously pointed out that human error is used in different ways: as a judgement, as a cause, as a process, as an effect. Dekker took the standpoint that human error was an effect rather than a cause, and the trouble existed within the systems that management had implemented. This came from Dekker's New View in ergonomics, and he explained this eloquently as human error is "a judgement made in hindsight". He insisted that workers do what they do as it makes sense at the time. His direction of thought was the accident is an emergent phenomena and does not have clear root causes. He pointed his finger at business procedures, and the messy interiors of companies, no matter what systems they propose to have in place. This readily applies to the construction industry and its company business models.

Dekker reinforced his ideas with this statement:

"The New View suggests that a search for the cause of failure is illusory—that there is no such thing as the cause of an accident; that trying to find out the cause of an accident is just as bizarre as trying to find out the cause of not having an accident."

Following on from the work of Dekker, Reason and Hopkins, the concept of high reliability organisations, HROs, surfaced. Their reliability was based around the concept of mindfulness, and Weick and Sutcliffe described the five processes, by which mature organisations manage the unexpected as follows:

HROs monitor "small failures"
HROs are "reluctant to accept simplification"
HROs remain "sensitive to operations"
HROs develop and maintain "a commitment to resilience"
HROs practice "deference to expertise"

Underlying these five processes was the acceptance that change happens and things do not operate as planned and expected. Small failures, sensitivity to what is going on at a point in time and deferring to expertise are key issues. In the construction industry change is common. Materials are not delivered or plant and machinery are not available and this requires change to

be managed on site. Very often this doesn't happen. Recent research by Rowlinson and others indicated that many accidents and incidents occurred because of the lack of proper application of mindfulness in a change situation.

Moving beyond the New View, recent research has delved into institutional logics and the mechanisms by which conflicting objectives brought about by different logics are manipulated on site in the construction industry. Cornelison looked at the concept of local rationality as an explanation for decision-making on construction sites. This led to an observation that many decisions were flawed in that they were either appropriate or inappropriate, rational or irrational and safe or unsafe. Jeschke, in an ethnographic study, looked at the conflict in paradoxical, institutional logics on construction sites in Denmark, the logics that were focused upon were regulation, professionalism and production. It became obvious that there was Production Pressure being brought to bear that conflicted with the regulatory and professional logics. This led to the development of bridging strategies that were identified as silent acknowledgement, dynamic, decision-making, and setting up of collaborative relational networks to resolve problems. One of Jeschke's observations from this study, was that these paradoxical logics lead to sub-optimal outcomes, and that there was a strong conflict between regulation, production and professionalism.

In conclusion, the evidence indicates that the business model adopted in the construction industry is broken. Such an approach is unsustainable for the industry and for the individual organisations and for society. This was noted and predicted to continue by Hillebrandt and others over 50 years ago. Hence, there is a need to go back to the work of those economists and the sociologists at the Tavistock Institute and to look at the industry's malaise through the lens of a sociotechnical system focus.